WHAT IS CLAIMED:

Sub A1

1. A coated optical fiber comprising:

an optical fiber and a radiation cured coating, wherein the radiation cured coating on the optical fiber comprises an oligomer wherein the oligomer is formed from a reaction comprising a polyol having "m" hydroxyl functional groups, wherein "n" hydroxyl groups of said polyol are terminated in forming the oligomer and "m" is greater than "n".

2. The coated optical fiber in claim 1, wherein the radiation cured coating further comprises a second oligomer.

3. The coated optical fiber in claim 1, wherein "m" – "n" ≥ about 1.

4. The coated optical fiber in claim 3, wherein "m" ≤ 4.

5. The coated optical fiber in claim 4, wherein a number average molecular weight of said oligomer is at least 6000 Daltons.

6. The coated optical fiber in claim 5, wherein the oligomer is a (meth)acrylated urethane oligomer.

7. The coated optical fiber in claim 6, wherein the radiation cured coating has a T_g of less than about - 30°C.

8. The coated optical fiber in claim 7, wherein the radiation cured coating includes a monomer having a functional group or groups selected from the group consisting of acrylates, methacrylates, acrylamides, N-vinyl amides, styrenes, vinyl ethers, vinyl esters, acid esters and combinations thereof.

9. The coated optical fiber in claim 8, wherein the monomer has a viscosity of less than about 500 centipoise and the monomer is an acrylate.

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10. The coated optical fiber in claim 9, wherein the radiation cured coating has a Young's modulus of less than about 1.2 MPa.

11. The coated optical fiber in claim 9, wherein the radiation cured coating has a Young's modulus of less than about 1.0 MPa.

12. The coated optical fiber in claim 9, wherein the radiation cured coating has a Young's modulus of about 0.85 MPa or less.

13. The coated optical fiber in claim 12, wherein the radiation cured coating has an elongation at break of greater than about 100 %.

14. The coated optical fiber in claim 13, wherein the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.1 dB/m at a wavelength of 1310 nm, of less than about 0.15 dB/m at a wavelength of 1550 nm, and of less than about 0.25 dB/m at a wavelength of 1625 nm.

15. The coated optical fiber in claim 14, wherein the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than about 0.151 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 0.75 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 1.4 (dB/km)/%strain at a wavelength of 1625 nm.

16. The coated optical fiber in claim 13, wherein the optical fiber has an effective area greater than about 70 μm², said effective area measured at a wavelength of 1550 nm, and the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.1 dB/m at a wavelength of 1310 nm, of less than about 0.3 dB/m at a wavelength of 1550 nm, and of less than about 1.0 dB/m at a wavelength of 1625 nm.

17. The coated optical fiber in claim 16, wherein the optical fiber has an effective area greater than about 70 μm², said effective area measured at a wavelength of 1550 nm, and the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than

about 0.151 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 2.0 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 4.0 (dB/km)/%strain at a wavelength of 1625 nm.

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18. A coated optical fiber comprising:

an optical fiber, a radiation cured primary coating and a radiation cured secondary coating, wherein the radiation cured primary coating has a T_g of less than about -30°C, a Young's modulus of less than about 1.0 Mpa, a tensile strength of at least 50 % of the modulus and an elongation to break of at least about 100 %.

19. The coated optical fiber in claim 18, wherein the radiation cured primary coating on the optical fiber comprises an oligomer wherein the oligomer is formed from a reaction comprising a polyol having "m" hydroxyl functional groups, wherein "n" hydroxyl groups of said polyol are terminated in forming the oligomer and "m" is greater than "n".

20. The coated optical fiber in claim 19, wherein the radiation cured primary coating has a T_g of less than about - 40°C,.a Young's modulus of less than about 1.0 Mpa, a tensile strength of at least 50 % of the modulus and an elongation to break of at least about 100 %.

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21. The coated optical fiber in claim 20, wherein the radiation cured primary coating comprises an oligomer wherein a number average molecular weight of said oligomer is at least 6000 Daltons.

22. The coated optical fiber in claim 21, wherein the radiation cured secondary coating has a Young's modulus greater than the Young's modulus of the radiation cured primary coating.

23. The coated optical fiber in claim 22, wherein the radiation cured secondary coating has a Young's modulus of greater than about 600 Mpa.

24. The coated optical fiber in claim 23, wherein "m" – "n" ≥ about 1 and "m" ≤ about 4.

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25. A coated optical fiber comprising:

an optical fiber,

a radiation cured primary coating and

a radiation cured secondary coating

wherein the radiation cured primary coating is the cured product of a bulk composition comprising:

an acrylated urethane oligomer,

an ethylenically unsaturated monomer and

a photoinitiator;

wherein the oligomer is formed from a reaction comprising a polyol having "m" hydroxyl functional groups, wherein "n" hydroxyl groups of said polyol are terminated in forming the oligomer and "m" is greater than "n", and said polyol has a number average molecular weight of at least 4000 Daltons;

wherein the ethylenically unsaturated monomer has an number average molecular weight of less than about 1000 Daltons;

wherein the radiation cured primary coating has a Young's modulus of less than about 1.0 MPa, a T_g of less than about -30 °C, an elongation to break of at least about 100%, and a tensile strength of at least 50% of the Young's modulus; and

wherein the cured radiation curable secondary coating has a Young's modulus of greater than about 600 MPa.

26. The coated optical fiber in claim 25, wherein "m" – "n" ≥ about 1 and "m" ≤ about 4.

27. The coated optical fiber in claim 26, wherein the radiation cured coating further comprises a second oligomer.

28. The coated optical fiber in claim 27, wherein the ethylenically unsaturated monomer is selected from the group of a mono-functional monomer, a poly-functional monomer, and mixtures thereof.

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29. The coated optical fiber in claim 28, wherein the ethylenically unsaturated monomer comprises a mono-functional monomer having a functional group selected from the group consisting of acrylates, methacrylates, acrylamides, N-vinyl amides, styrenes, vinyl ethers, vinyl esters, acid esters and combinations thereof.

30. The coated optical fiber in claim 29, wherein the monomer has a viscosity of less than about 500 centipoise and the monomer is an acrylate.

31. The coated optical fiber in claim 30, wherein the radiation cured primary coating has a T_g of less than about –40 °C.

32. The coated optical fiber in claim 31, wherein the acrylated urethane oligomer is present in an amount from about 40 to about 65 weight percent, the ethylenically unsaturated monomer is present in an amount from about 60 to about 20 weight percent, and the photoinitiator is present in an amount from about 0.1 to about 10 weight percent of a bulk radiation curable primary coating composition.

33. A coated optical fiber comprising:

an optical fiber,

a radiation cured primary coating and

a radiation cured secondary coating

wherein the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.3 dB/m at a wavelength of 1310 nm, of less than about 0.35 dB/m at a wavelength of 1550 nm, and of less than about 0.55 dB/m at a wavelength of 1625 nm.

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34. The coated optical fiber in claim 33, wherein the radiation cured primary coating is the cured product of a bulk composition comprising:

an acrylated urethane oligomer,
an ethylenically unsaturated monomer and
a photoinitiator;

wherein the oligomer is formed from a reaction comprising a polyol having "m" hydroxyl functional groups, wherein "n" hydroxyl groups of said polyol are terminated in forming the oligomer and "m" is greater than "n".

35. The coated optical fiber in claim 34, wherein the oligomer has a number average molecular weight of at least 4000 Daltons.

36. The coated optical fiber in claim 35, wherein the ethylenically unsaturated monomer has an number average molecular weight of less than about 1000 Daltons.

37. The coated optical fiber in claim 36, wherein the radiation cured primary coating has a Young's modulus of less than about 1.0 MPa, and a T_g of less than about -40 °C.

38. The coated optical fiber in claim 37, wherein the cured radiation curable secondary coating has a Young's modulus of greater than about 600 MPa.

39. The coated optical fiber in claim 33, wherein the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.1 dB/m at a wavelength of 1310 nm, of less than about 0.15 dB/m at a wavelength of 1550 nm, and of less than about 0.25 dB/m at a wavelength of 1625 nm.

40. The coated optical fiber in claim 39, wherein the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than about 0.151 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 0.75 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 1.4 (dB/km)/%strain at a wavelength of 1625 nm.

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41. The coated optical fiber in claim 33, wherein the optical fiber has an effective area greater than about 70 μm^2, said effective area measured at a wavelength of 1550 nm, and the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.1 dB/m at a wavelength of 1310 nm, of less than about 0.3 dB/m at a wavelength of 1550 nm, and of less than about 1.0 dB/m at a wavelength of 1625 nm.

42. The coated optical fiber in claim 41, wherein the optical fiber has an effective area greater than about 70 μm^2, said effective area measured at a wavelength of 1550 nm, and the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than about 0.151 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 2.0 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 4.0 (dB/km)/%strain at a wavelength of 1625 nm.

43. A coating for an optical fiber comprising:

a radiation curable primary coating

wherein the radiation curable primary coating comprises an oligomer wherein the oligomer is formed from a reaction comprising a polyol having "m" hydroxyl functional groups, wherein "n" hydroxyl groups of said polyol are terminated in forming the oligomer and "m" is greater than "n".

44. The coating in claim 43, wherein the radiation cured coating further comprises a second oligomer.

45. The coating in claim 43, wherein "m" – "n" ≥ about 1.

46. The coating in claim 45, wherein m ≤ about 4.

47. The coating in claim 46, wherein a number average molecular weight of said oligomer is at least 6000 Daltons.

48. The coating in claim 47, wherein the oligomer is a (meth)acrylate urethane oligomer.

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49. The coating in claim 48, wherein the radiation cured coating has a T_g of less than about - 40°C.

50. The coating in claim 49, wherein the radiation cured coating includes a monomer having a functional group or groups selected from the group consisting of acrylates, methacrylates, acrylamides, N-vinyl amides, styrenes, vinyl ethers, vinyl esters, acid esters and combinations thereof.

51. The coating in claim 50, wherein the monomer has a viscosity of less than about 500 centipoise and the monomer is an acrylate.

52. The coating in claim 51, wherein the radiation cured coating has a Young's modulus of less than about 0.85 MPa.

53. The coating in claim 52, wherein the radiation cured coating has an elongation at break of greater than about 100 %.

54. A method of coating an optical fiber comprising the steps of:

(a) drawing an optical fiber comprising a core and a cladding;

(b) coating the optical fiber with a radiation curable coating; and

(c) irradiating the optical fiber at a dose level of from about 0.5 J/cm^2 to about 1.0 J/cm^2;

wherein the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.3 dB/m at a wavelength of 1310 nm, of less than about 0.35 dB/m at a wavelength of 1550 nm, and of less than about 0.55 dB/m at a wavelength of 1625 nm.

55. The method in claim 54, wherein the radiation curable coating comprises an oligomer wherein the oligomer is formed from a reaction comprising a polyol having "m" hydroxyl functional groups, wherein "n" hydroxyl groups of said polyol are terminated in forming the oligomer and "m" is greater than "n".

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56. The method in claim 55, wherein the radiation cured coating further comprises a second oligomer.

57. The method in claim 55, wherein "m" – "n" ≥ about 1.

58. The method in claim 57, wherein m ≤ about 4.

59. The coated optical fiber in claim 54, wherein the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.1 dB/m at a wavelength of 1310 nm, of less than about 0.15 dB/m at a wavelength of 1550 nm, and of less than about 0.25 dB/m at a wavelength of 1625 nm.

60. The coated optical fiber in claim 59, wherein the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than about 0.151 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 0.75 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 1.4 (dB/km)/%strain at a wavelength of 1625 nm.

61. The coated optical fiber in claim 54, wherein the optical fiber has an effective area greater than about 70 μm^2, said effective area measured at a wavelength of 1550 nm, and the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.1 dB/m at a wavelength of 1310 nm, of less than about 0.3 dB/m at a wavelength of 1550 nm, and of less than about 1.0 dB/m at a wavelength of 1625 nm.

62. The coated optical fiber in claim 61, wherein the optical fiber has an effective area greater than about 70 μm^2, said effective area measured at a wavelength of 1550 nm, and the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than about 0.151 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 2.0 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 4.0 (dB/km)/%strain at a wavelength of 1625 nm.

63. A method of making an optical fiber coating comprising the steps of :

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(a) reacting an isocyanate with an ethylenically unsaturated compound having OH, SH or NH_2 groups to form an intermediate;

(b) reacting the intermediate with a polyol having "m" hydroxyl groups wherein "n" hydroxyl groups of the polyol are terminated by the intermediate to form an oligomer with "m" – "n" free hydroxyl groups; and

(c) blending the oligomer with a monomer and a photoinitiator.

64. The method in claim 63, wherein "m" – "n" $\geq$ about 1.

65. The method in claim 64, wherein m $\leq$ about 4

66. The method in claim 65, wherein the formed oligomer has a number average molecular weight of at least 6000 Dalton.

67. The method in claim 66, wherein the monomer has a functional group or groups selected from the group consisting of acrylates, methacrylates, acrylamides, N-vinyl amides, styrenes, vinyl ethers, vinyl esters, acid esters and combinations thereof.

68. The method in claim 67, wherein the monomer has a viscosity of less than about 500 centipoise and the monomer is an acrylate.

69. The method in claim 68, wherein the ethylenically unsaturated compound which is reacted with the isocyanate has one equivalent of OH, SH or NH_2 for every two equivalents of NCO of the isocyanate.

70. A method of making an oligomer for an optical fiber coating comprising the steps of :

(a) reacting an isocyanate with an ethylenically unsaturated compound having OH, SH or NH_2 groups to form an intermediate with some free isocyanate groups; and

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(b) reacting the intermediate with a polyol having "m" hydroxyl groups wherein "n" hydroxyl groups of the polyol are terminated by the intermediate to form an oligomer with "m" – "n" free hydroxyl groups.

71. The method in claim 70, wherein "m" – "n" ≥ about 1.

72. The method in claim 71, wherein m ≤ about 4

73. The method in claim 72, wherein the formed oligomer has a number average molecular weight of at least 6000 Dalton.

74. The method in claim 73, wherein the ethylenically unsaturated compound which is reacted with the isocyanate has one equivalent of OH, SH or NH_2 for every two equivalents of NCO of the isocyanate.

75. The coated optical fiber in claim 6, wherein the radiation cured coating has a T_g of less than about - 35°C.

76. The coated optical fiber in claim 6, wherein the radiation cured coating has a T_g of less than about - 40°C.

77. The coated optical fiber in claim 13, wherein the coated optical fiber has a micro-bend attenuation as measured by the LLWM test of less than about 0.3 dB/m at a wavelength of 1310 nm, of less than about 0.35 dB/m at a wavelength of 1550 nm, and of less than about 0.55 dB/m at a wavelength of 1625 nm.

78. The coated optical fiber in claim 77, wherein the coated optical fiber has a micro-bend attenuation as measured by the EDM test of less than about 0.35 (dB/km)/%strain at a wavelength of 1310 nm, of less than about 1.1 (dB/km)/%strain at a wavelength of 1550 nm, and of less than about 2.0 (dB/km)/%strain at a wavelength of 1625 nm.